

REMARKS

Reconsideration of this application is requested. Claims 1-12 are active in the application.

Attention is directed to the Information Disclosure Statement filed April 21, 2003 which had as its genesis an Official Action received in a counterpart foreign application. The filing of the IDS is within the allotted time period for doing so. With this response we have paid the relevant fee to assure consideration of the IDS filed April 21, 2003.

It is proposed to amend claims 1, 3, 4 and 7 in order to more particularly point out and distinctly claim that which applicants regard as their invention. Specifically, it is proposed to amend the claims to specify that the honeycomb sandwich panel has a closed cross section, that is the front surface layer and the rear surface layer are fused to the honeycomb core to close the openings thus in this manner improved torsional rigidity is achieved. See the discussions at page 5, lines 19-24 and 14, lines 24-26 associating this closed cross section cell with improved torsional rigidity.

It is also proposed to amend the claims, where appropriate, to describe the nature of the material forming the front and rear surface layers as being based on a matrix of a phenolic resin which becomes porous when it is cured after being heated and thereby allows passage of air between the inside and outside of the fused and closed cells. This feature of the invention is discussed in the specification at page 8, lines 7-10 and again at lines 16-22. Clearly there is basis for the amendments proposed to claims 1, 3, 4 and 7.

Entry of this amendment is solicited in particular since the Official Action cites and applies for the first time two new references yet the rejection has been made final in nature.

Applicants' amended claims are entirely different from the structures described in either of the newly applied references. As recited in the amended claim 1, the present invention relates to a honeycomb sandwich panel in which the front surface layer and the rear surface layer closing the openings of the cells of the honeycomb core are made of a

fiber reinforced plastic using a phenolic resin as a material. The fiber reinforced plastic is porous and air permeable, utilizing a characteristic of the phenolic resin employed, which becomes porous when it is cured after being heated and allows passage of air between the inside and outside of the cells of the honeycomb core.

With this unique fused cell structure, when the honeycomb sandwich panel of the present invention is used in a vacuum, the air in the cells goes out through the front and rear surface layers. Thus, since the pressures in the inside and the outside of the sandwich panel are kept equal, the front surface layer 13 and the rear surface layer 14 are prevented from being damaged or removed (detached) from the honeycomb core.

Reference 1 (U.S. patent No. 3,914,494) to Park relates to a woven fabric, which is light in weight and effective for reducing noise. The Park invention was made to address the drawback of the conventionally woven fabric that some crimps are formed at the warp and weft cross-over points and the tensile strength is lower than that of a unit material (column 1, lines 56-66). The composite article having an "open weave" structure as shown in FIG. 1 exhibits a high ratio of opening areas to the total area of the article and a small bulk density, while the properties of the fabric are fully maintained (column 11, lines 56-63).

Park indicates phenolic resins as an example of a suitable matrix resin among others (column 9, lines 5-11). It also discloses that the composite article of its invention is applicable to honeycomb panels for aircraft (column 11, line 64 to column 12, line 5). However, in Park the permeability is obtained by the weave of the reinforced fabrics.

Clearly from examining the drawings of the Park reference, notably FIG. 2, a plurality of layers or plies are provided, one atop another, and it is through this arrangement that permeability is obtained. While it is true that the document itself mentions "honeycomb" at column 12, line 4, taken in its overall context to construct a honeycomb the multiple ply carbon fiber reinforced material itself would be formed into a honeycomb core structure which would include not only the facings but the cells themselves.

Park has no appreciation or realization that front and rear surface layers when fused to close the openings in the cells imparts additional torsional rigidity to the honeycomb sandwich panel nor that one may conveniently employ a matrix using a phenolic resin which subsequent to processing becomes porous and allows passage of air. The disclosures of Park in no way anticipate nor are they suggestive of the claims of the present application when considered alone or in combination with a secondary reference.

Thus Park does not disclose the features of the present invention recited in amended claim 1 "the fiber reinforced plastic using a phenolic resin as a matrix is porous and air permeable, utilizing the characteristic of phenolic resin, which becomes porous when it is cured after heating" and "the fiber reinforced plastic allows passage of air between the inside and outside of the cells". Reconsideration and withdrawal of this rejection is in order.

Reference 2 (U.S. Patent No. 4,496,924) to Wolf et al discloses a panel, in which a porous GF skin (the element 22 in FIG. 1) is adhered to a honeycomb core by an impervious thermoplastic sheet. The description in column 1, lines 27-31 defines the term "porous", referring to air permeability. However, since the porous skin is adhered to the thermoplastic sheet, it is doubtful whether the overall surface of the panel has air permeability in the thickness direction.

The Examiner directs attention to the discussion in Wolf at column 2, lines 38-49 which does, as asserted, mention the word "porous" in terms of fiber glass pelt (perhaps "felt" was intended?). This discussion refers to FIG. 1 of the drawings and also provides detailed information as to the use of a thermoplastic sheet 20 which is applied directly to the open cells of the honeycomb structure. The pelt is said to have a certain phenolic resin content and the reason for this is so that the pelt will be retained permanently in a compressed state. There is no indication in this passage that the compressed state of the pelt will be porous, in fact compression would indicate the opposite. This is all the more so because of the presence of the thermoplastic sheet layer 20 which is placed over the

cell end plane of the honeycomb core 12 and appears to be an impervious layer that would remain as such both before and after compression and processing.

Wolf shares the same deficiencies as Park in that it too fails to disclose or suggest the features of the present invention recited in amended claim 1, namely "the fiber reinforced plastic using a phenolic resin, as a matrix is porous and air permeable, utilizing the characteristic of phenolic resin which becomes porous when it is cured after heating" and "the fiber reinforced plastic allows passage of air between the inside and outside of the cells.

Based upon the deficiencies in each of the references both cited as anticipations, it is clear that even if the two are combined, (counsel submits there is no motivation to combine these two references) still the subject matter of the claims of this application would not result. Accordingly, the rejection set out in item 5 of the Official Action is misguided as the combination of references (even assuming correctness, which applicants do not) would not result in the subject matter defined by the claims presented in this response.

Having responded to all of the pending rejections contained in the Office Action, (paper No. 10), applicants submit that the claims are in condition for allowance and earnestly solicit an early notice to that effect. The examiner is invited to contact the undersigned if any further information is required.

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Respectfully submitted,

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